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MOONSHINE MORPHINE

By Dr. Edwin E. Slosson

The offer of a $100,000 reward by Herman A. Metz for the discovery of a process for the cheap manufacture of synthetic morphine, calls public attention to the possibility that the chemist may at any moment upset the best laid plans of legislators and financiers, as he has often done before. If the Metz prize, or the still greater pecuniary profits of the process, should instigate such a discovery, the elaborate schemes of tariff regulations and the complicated negotiations for international control would at once become futile.

The opium crop of India might be wiped out as was the indigo crop by the discovery of synthetic indigo of 1902. The British conscience would be relieved of the temptation to maintain an open opium market which caused Great Britain in 1840 to make war on China, and which induced her to block the recent attempts of the League of Nations to suppress the traffic.

If the habit-forming drugs may be made anywhere by anybody who knows how, the question ceases to be an international issue and becomes a matter of local police powers. But then the difficulty would arise of how to prevent illicit manufacture. If the synthetic process were publicly known and simple to carry out, it would be harder to prohibit or to regulate than alcohol, because the drugs are easier to conceal and smuggle and the profits are larger. Morphine and cocaine sell for about $175 a pound, and if they could be made cheaply from chemicals easily procurable, there might arise a thriving industry- or rather business in moonshinemorphine and contraband cocaine.

Although the number of drug addicts in the United States has decreased since the passage of the Anti-Narcotic Act, there are between 100,000 and 150,000 according to the estimates of the U. S. Public Health Service. So there is still a market for the illicit traffic, but we may hope that the manufacture of such drugs artificially, when we learn how to do it, may be so centralized in a few factories that it may be kept under close supervision. Possibly the patents could be put under the control of the League of Nations or of the Narcotic Committee of the International Police Conference.

The offer of the $100,000 prize indicates that a satisfactory method of making synthetic morphine is yet unknown to the public, though some chemist may come forward any day with the formula.

Heroin, which according to the New York Police reports is used by ninety-four per cent of the criminal drug addicts, is not a natural product but a synthetic compound, being made by the action of acetic acid on morphine. But morphine has so far been prepared from opium which comes from the juice of poppy pods. The morphine molecule is very complicated and its structure is not certainly known.

Synthetic cocaine is a more practicable proposition and has infact been actually accomplished. Prof. Richard Willstaetter of Berlin has worked out three different ways of making alkaloids of the cocaine family, one of which "psicain" is claimed to be a stonger local anesthetic than the natural. Prof. Julius von Braun of Breslau has been working on the same problem for the last ten years. The synthetic products usually differ from that extracted from the coca leaves. The natural twists a ray of polarised light to left while the artificial is apt to be neutral. Their physiological action may be different also. But on October 31, 1925, a British patent was taken out for the manufacture of left-handed cocaine, identical with the vegetable product.

The primary materials used in making synthetic cocaine are mostly cheap and common chemicals; one of them is citric acid, the lemon acid; another is ammonium chloride, our familiar "sal ammoniac"; and a third is formaldehyde, the household disinfectant.

Several synthetic substitutes for cocaine, such as novocaine or procaine, have come into use, since they are quite as effective and are not habit-forming. Some day, we may be confident, the chemist may find out how to make these useful but seductive drugs, but by that time he may be making other compounds superior to the natural.

SCARLET FEVER CONQUERORS TELL LATEST DISCOVERIES

Scarlet fever, within the very recent past an unconquered scourge of children, has been beaten by means of its own poison. Scarlet fever toxin injected into the skin tells whether or not one is susceptibleto the disease; injected deeper and in larger doses it causes the body to build up resistance against it. The details of the successful campaign against this malady will be told by its conquerors, Drs. George F. and Gladys H. Dick, of the John McCormick Institute for Infectious Diseases, in the next issue of the Journal of the American Medical Association.

The Dick test for susceptibility to scarlet fever is not unlike the Schick test for susceptibility to diphtheria. A toxin solution is prepared by planting the bacteria of scarlet fever in sterile broth, and after a suitable time allowed for their growth, removing the germs and sterilizing the broth by passing it through a procelain filter. The strength of the toxin must then be tested on human volunteers, for animals cannot be used successfully in these tests.

After the strength is determined , a little of the toxin solution is injected into the skin of the suspected person. If no reaction follows, the person is judged immune. If a pinkish or red discoloration the size of a dime or larger takes place, the person is likely to develop scarlet fever in case he is exposed.

Much larger doses of the same kind of toxin are then injected into the subject's tissues. These may cause him to feel vaguely ill, but the malaise soon

passes, and in the meantime his system has developed an antitoxin that has destroyed the injected toxin, and has the power of neutralizing the results of any subsequent natural exposures to the disease. Tests since the discovery of this toxin have shown that non-immune persons properly inoculated become immune within two weeks and remain so for at least eighteen months.

The investigators state that an antitoxin has also been developed, using horses' blood, after the fashion of the diphtheria antitoxin. This is now being used with success in the treatment of cases of active scarlet fever. Its use is not recommended , however, for prevention, because the passive immunity conferred is short-lived as compared with the active immunity developed by the use of the toxin itself.

NOISE STOPS INFANT GROWTH

Noise and turmoil affect the health and well being of babies as well as grown people, according to a report of the London representative of the American Medical Association. St. Andrews Institute for Clinical Research in a survey of 457 infants found that certain children brought up in noisy and unrestful surroundings failed to thrive in spite of the most careful regulation of diet. Given quiet and peace, the youngsters recovered and developed normally.

BRIGHT CHILDREN PHYSICALLY AS WELL AS MENTALLY SUPERIOR

The old idea that bright children are inclined to be sickly, "queer" and different from their less gifted playmates, has received a blow from the work of Dr. Lewis M. Terman, head of the department of psychology of Stanford University. Since 1910, Dr. Terman, with the aid of fourteen associates, has examined two hundred and fifty thousand school children. Of these, the best one per cent. are being studied in greater detail, and their development followed as closely as possible to obtain definite knowledge of characteristics that distinguish young genius and to determine how they fulfill their early promise.

These superior children have been found to be as a class a little heavier, larger, better nourished and healthier than the average of unselected children of their age. Their ancestry are also somewhat longer lived than the average. Better proportioned physically and more stable nervously, these precocious children when actually examined have upset the old ideas.

In school work they surpass in all direction as a group and display a wider range of information. They are not freakish or irregular in their abilities. There is nothing strange or mystical in their interests outside their studies. They enjoy and play games, though they like games with thinking in them. They differ from the general run in degree rather than in any way that sets them off as fundamentally different. Their superiority manifests itself at an early age, though it is not always discovered by teachers and given sufficient opportunity for full play in school work.

Some of the children who were subjects of early studies 14 or 15 years ago are now demonstrating that indications of early superiority have been justified by adult ability.

PHOTOGRAPHS INSIDE RIFLE BARREL

A miniature edition of the submarine periscope is the essential part of a new camera which permits photographs to be made of the inside of a rifle barrel, it was announced at the Bureau of Standards recently. The device is the invention of Dr. I. C. Gardner and Frank A. Chase of the bureau, and uses a periscope small enough to enter a 30 caliber barrel, the size used in army rifles and machine guns, illumination being provided by a tiny incandescent lamp. The periscope, lamp and camera remain stationary, while the barrel is moved along and the photograph made on a strip of motion picture film.

The advantage of the apparatus, it is claimed , is that it is not necessary to saw the barrel in two, as formerly, when it is desired to examine the bore. With the new apparatus, tests may be made over a long period of time, and photographs made at intervals to determine the effect.

WORLD'S OLDEST JEWELRY BROUGHT TO AMERICA

The oldest manufactured jewelry in the world, ivory, deer horn, and stone beads used as ornaments by cave men and cave women of prehistoric Europe, was recently brought to this country by Alonzo W. Pond of the Beloit College Museum and is now on display at that institution. Besides the beads, which were found in the Cave La Blanchard, Department of Dordogne, France, the sharp blades and stone drills with which the beads were pierced, are also included in the collection.

In order to display the collection to the best advantage, the various beads have been strung in the form of a necklace similar to the kind which may have been worn more than twenty thousand years ago.

FINDING SIX PER CENT COLOR BLIND SWEDES ADOPT NEW SIGNALS

To aid the color blind in distinguishing light signals at railroad crossings the Swedish State Railways have decided, after an exhaustive investigation, to abolish the green light in favor of bluish-white and to adopt a special shade of red, which tests have shown to be most easily recognized by all automobile drivers. Furthermore, the lights installed at crossings owned by the State, will be additionally differentiated by blinking at different speeds when there is no danger and when a train is approaching, so that even if a person cannot tell any color from another, he cannot fail to observe the frequency with which the light flickers.

The State Railways eye specialist, Dr. C. C. Bostrom, has conducted the experiments and has found that between five and six per cent. of all males are color-blind and that, since practically every one in Sweden wants to drive a car, it would be unjust to deprive these men of the privilege, as proposed in the Riksdag. At the same time many accidents have been found to be due to the inability of drivers to tell the green lights from the red, so that from July 1 this year the new double precaution will be adopted.

Another device to safeguard railroad crossings has been invented by a Swedish engineer, A. Westfelt, and tests have been made at certain crossings on the State lines. It consists of a bar that swings out seven feet above the ground whenever a train approaches and a row of short chains that strike any car trying to pass under without injuring it. Being placed about eighty feet feet from the crossing, the bar gives the driver warning in time to stop before reaching thetracks, but at all times it remains high enough in the air to escape being crashed into. It is operated automatically by the approaching trains, and when danger is over it swings back alongside the roadway.

YEAR'S FIRST COMET DISCOVERED BY ACCIDENT

Shajn' s comet, the first to be discovered during 1925, which was picked up at the Simeis Observatory in the Crimea, Russia, in March, was found as a result of a mistake in operating the telescope. This was revealed by Dr. Otto Struve, of the Yerkes Observatory, who has just received a detailed account of the event from G. Shajn, the discoverer, with whom he was formerly associated at the Pulkovo Observatory, near Leningrad.

During the first four nights after his arrival, observations were impossible on account of clouds, said Mr. Shajn, but during the fifth night it suddenly cleared up about midnight, and he decided to make a trial exposure with the photographic telescope. He was not used to the instrument, which must be kept pointed at the object which it is desired to photograph, and he moved it the wrong way. This happened to be the direction and speed with which the comet was moving, so when the plate was developed, the comet was detected. If the telescope had been guided properly, the comet would not have been noticeably different from the stars.

IMPURE MINERALS BEST FOR CRYSTAL DETECTORS

Impurities in radio detector crystals improve their operation, according to Dr. Edgar T. Wherry, of the Bureau of Chemistry of the U. S. Department of Agriculture. As a result of his studies of 75 minerals, he believes that sensitive spots, which the "cat's whisker" must tickle, are due to peculiar arrangement of the atoms, in which the electrons exert a greater attraction in one direction , and enables the crystal to do its work. When certain impurities are present, irregularities in the structure of the crystal result, causing this one-sided attraction.

DRIFTING DERELICTS SHOW OCEAN CURRENTS

A veritable "Flying Dutchman", a ship without crew or sails, the four-masted schooner "Governor Parr" is now being carried by the Canary Current off the northwest coast of Africa towards the Sargasso Sea, in the opinion of A. B. McManus of the Hydrographic Office of the United States Navy.

This vessel, one of the most famous derelicts of recent years, sailed from Nova Scotia for Brazil on Sept. 27, 1923, with a load of lumber. But she soon struck a storm and on October 3, after the ship had been badly damaged, the crew was rescued and the ship abandoned. At this time she was south of Newfoundland. Wind and current since then have carried her on an extended cruise of the northern Atlantic.

Her cargo of lumber has kept her afloat, although waterlogged, but she continues to be a menace to shipping. Efforts to destroy her have so far been unsuccessful, even though in December, 1923, the U.S.S. Coast Guard Cutter "Tampa" took her in tow, for they struck a gale and the "Governor Parr" was again let loose.

By August, 1924, the schooner had reached a position about 300 miles southwest of Lisbon, Portugal, when, on the 11th, she was reported on fire. But even this was not sufficient to end her wanderings and on the 13th the fire was out. Then she crossed the much travelled line of vessels going towards or from the straits of Gilbraltar, but was only seen twice. Last of all, on October 14, she had been carried by the Canary Current to a position between the Canary Islands and the coast of Africa, having travelled about 4,000 miles in a little over a year.

At present, the ship's location is not known, but Mr. McManus thinks that the Canary Current has carried her into the path of the trade winds, so that she is probably moving westwards, and may eventually return to her starting point. This would duplicate the case of the Fanny E. Wolston, which made a complete circuit of the northern Atlantic between 1891 and 1894.

WHITE ANTS ENDANGER UNTREATED BUILDINGS

The U. S. Bureau of Entomology has issued a warning to prospective home buyers, against houses not made proof against termites or white ants in regions where these pests abound. Wherever they can get at wood that has not been creosoted or otherwise made termite-proof they will ruin it in a short time. All untreated wooden parts of houses should be carefully kept away from contact with the earth. Puchasers should be particularly watchful to see that this has been done in houses which they buy, the entomologists state, and municipal building regulations should include rules to cover this point.

NOISY EATING BETRAYS DESTRUCTIVE INSECTS

Bad table manners and loud chewing are the undoing of certain insects and grubs inhabiting sacks of peanuts imported from the orient. Their noisy champing, intensified by means of a newly invented microphone, enables the customs service and pure food bureau officials to detect their presence. The new apparatus is also very useful in detecting insect pests in fruit and stored grain.

MONKEYS MUST BE TRAINED BEFORE THEY THROW COCONUTS

In Pattani, a southern province of Siam, and in Kelantna, one of the unfederated Malay States, monkeys are trained by the natives to pick coconuts and edible seed pods for their master, according to D. Bourke of the Indian Forest Service, who has made an interesting observation of a new commercial use of trained domestic animals.

The romantic notion- derived from literature of the Swiss Family Robinson type- that monkeys naturally climb coconut palms and throw down the nuts out of mischief or from a desire to oblige, is pure fiction. The monkeys must be caught

young and carefully trained to their jobs by attaching them to a long pole on the top of which is fastened a bunch of fruit. The animals quickly learn to run up to the fruit and throw it down for their own food. Having once mastered the central idea, as it were, they can then be perfected in theirprofession in the palm trees.

When one considers how very few of the thousands of wild animals man has domesticated and trained to really useful jobs - not more than a dozen, if circus exhibitions and the like are excluded - this use by the Malays and Siamese of the monkey is an appreciable contribution.

Everywhere in Siam and Malaya one sees monkeys kept as pets, but Mr. Bourke was struck by the extraordinary number that he saw in Pattani. Every hut had one or two chained in the doorway, and the natives walked about followed by monkeys attached to long coir ropes. The explanation for this unusual fondness for the animals was the above utilitarian one.

Only the larger monkeys are successful with the coconuts. It requires considerable effort and frequently the use of teeth as well as hands to detach the nuts. But the smaller monkeys can readily manage the pods which grow in small clusters on the ends of the branches of the sataw tree, and which provide the natives with an important food item. The seeds resemble a broad bean, and are eaten as a vegetable, both raw and cooked. It is said that a well-trained monkey can pick as many pods in a day as a man, thus enabling his fortunate owner to earn a full day's wages with a minimum amount of effort.

BLOOD TESTS OF APES SHOW CHEMICAL KINSHIP WITH MAN

Chemical affinities between the blood of apes and man, much closer than the similarity between that of the tailed monkeys and man, have been shown by serological tests just completed by Drs. K. Landsteiner and C. Philip Miller, Jr., of the Rockefeller Institute.

Human beings are grouped into four classes according to the chemical nature of their blood, and the tests showed that the various species of large apes could be assigned to one or another of these classes. The blood of the tailed monkeys, however, reacted in a manner not nearly so similar to that of human beings, while the blood of a lemur, belonging to an even lower group of monkey-like animals, likewise failed to show close realtionship.

Current evolutionary theory holds that men and apes are related by descent from a common ancestral stock, and may be rated as a kind of zoological cousins, while the connection with the tailed monkeys of the new world has been considered to be quite remote. The results of these experiments are interpreted as evidence in support of the theory.

JOHN HOPKINS ZOOLOGIST HONORED IN PHILADELPHIA

Researches in the most primitive known animals, the amoebae, and the rotatoria or "wheel animalcules" have won for Dr. Herbert Spencer Jennings, professor of zoology at the Johns Hopkins University, Baltimore, the first award of the Joseph Leidy medal of the Academy of Natural Sciences of Philadelphia. This award was established by Dr. Joseph Leidy II, in memory of his uncle, Dr. Joseph Leidy, famous paleontologist, who was at one time president of the Academy, and is to be given every three years.

FOSSIL WHALES' SENSE OF SMELL INVESTIGATED

How the toothed whale lost its sense of smell has been discovered by Remington Kellogg of the U. S. Biological Survey.

It is known that the zeuglodon, ancient ancestor of the whales, had a useful smelling organ, Mr. Kellogg states. But in later ages, bones in the toothed whale's skull began to telescope, and this slipping progressed until the openings through which the olfactory nerves had to pass were closed by a continuous sheet of bone. The whalebone whale escaped this cavastrophe because the bones in the beak of itsskull locked so that they could not slip.

"The toothed whale's smelling apparatus is of the kind that is found in any air breathing animal," says Mr. Kellogg. "The blow holes through which the whale breathes have olfactory sacs in their back walls. These sacs correspond to the nose of a human being."

Whether the whales that have a sense of smell make any particular use of it is not known, as no living whales have been put to scientific test.

TACT, NOT TALK, CURES BABY'S FOOD WHIMS

"With tact a child may be taught to like foods against which he has formed a prejudice," says Miss C. Powena Schmidt of the U. S. Bureau of Home Economics. She suggests:

Let the child see you eat the food he dislikes.
Approve his efforts to eat, but don't overdo it - this beats punishments for failure.
Vary the method of preparation of the disliked food.
Serve small amounts of the disliked foods along with some preferred food.
Withhold favorite food until less desired food is eaten - and say nothing.
While mothers are trying out these methods, Miss Schmidt is continuing her psychological survey to find how such food whims start and what methods children use to avoid eating what they dislike.

NEW SPECTACLES AND COLOR MATCHING

No longer need a clothing store salesman take a suit to the window to show the prospective customer the effect in daylight, or even turn on a special light. Instead, he will soon be able to hand the customer a pair of day-light spectacles, which have been invented by Dr. Hermann Weiss of Vienna. Already they have come into wide use in laboratories in the textile. paper and dye industries, where it is often necessary to judge the color of solutions. They are of blue glass which absorbs some of the yellow rays in which the ordinary incandescent lamp is rich but which are not present in such abundance in sunlight.

The yearly stream of visitors in the American National Parks has increased from 250,000 in 1914 to over 1,600,000 in 1924.

WHERE AUTOMOBILES RUN AFFECTS ROAD DESIGN

That highways should be designed with extra thick edges is indicated by a survey of where on the road automobiles run made by the U. S. Bureau of Public Roads. This investigation showed that motor trucks are habitually driven closer to the edge than passenger vehicles and that the heaviest load placed on the payment comes about six inches from the edge.

Drivers of speeding vehicles tend to crowd closer to the center. Too high a crown to the highway or a bad shoulder also cause machines to run nearer the middle.

Highways should be at least 18 feet wide and not over 20 feet wide for two way traffic, the experts declared after the observations.

HOT SPRINGS CRYSTALS LONG TIME IN MAKING

The infinite patience and unlimited time used by Nature in her works are strikingly illustrated by a phenomenon at Mammoth Hot Springs to which Dr. Jerome Alexander of New York calls attention. The limestone deposits now being laid down by the hot springs do not have any visible crystals, but similar formations of an age estimated at 20,000 to 30,000 years are distinctly crystalline. Thus over two hundred centuries were required for the completion of this one natural "experiment".

PART OF EARTH'S CRUST FORMED MOON, SAYS SCIENTIST

The earth is the parent of the moon in more than a poetic sense, in the opinion of Dr. R. H. Rastall, lecturer in economic geology at Cambridge University, who recently announced a theory that our satellite is made of material that was once part of the earth's crust.

Dr. Rastall's theory, however, differs from that of Sir George Darwin and others who have previously made similar suggestions, for he thinks that a layer of the earth's crust, about 41 miles thick, and covering about two-thirds of its total area was peeled off by the attraction of the sun. This tidal action of the sun was effective while the crust was still in a plastic state, and the moon's own gravitational attraction caused it to roll up into a ball of the form that we now see in the sky. The crustal area left on earth formed the continents.

This theory also accounts for the fact that while, according to generally accepted ideas, masses of lighter density such as make up the earthly continents should cover the entire surface of the globe, they actually cover only about a third, the missing two thirds consisting of the moon. Measurements of the moon's density by its effect on the earth show that it is about three and a half times as heavy as an equal volume of water. This is more dense than the average for the continental land masses, but Dr. Rastall assumes that at the time of the disruption, some of the heavier underlying material was also torn away.

The new theory also fits in with the ideas recently set forth by a German geologist, Prof. Alfred Wegener, who believes the American continent was originally united with Europe and Africa, and that it floated away to its present place.

This would not have been possible as long as the entire earth was covered with such a crust, but after the moon had been torn away, it was possible for the continents to separate from their long embrace.

TABLOID BOOK REVIEWS

"INTERNATIONAL EDUCATIONAL RELATIONS OF THE UNITED STATES", by David Allan Robertson, published by the American Council on Education, 26 Jackson Place, Washington, D. C.

Anyone who is interested in the question of travelling fellowships, exchange professorships, or other international aspects, will find indispensable this directory of over a hundred educational and international organisations.

"METALLURGY AND ITS INFLUENCE ON HUMAN PROGRESS", an address delivered before the Oxford University Junior Scientific Club by Sir Robert A. Hadfield, Bt.

For those interested in the history of chemistry this is a mine of rare material, especially the anecdotes and personal reminiscences of Oxford men who have aided in the advancement of metallurgy; none of them, however, more distinguished than the author whose discovery of manganese steel in the early eighties inaugurated the modern era of hard steel alloys.

The velocity of the most rapid earthquake waves averages over 300 miles a minute and the slowest waves can travel entirely around the world in about three hours.

The United States Civil Service Commission has adopted the term "enginoman" to designate persons who operate a stationary or moving engine reserving "engineer" for those with a technical training.

French chemists have developed an artificial resin from which panels for radio sets are to be made.

Remains of a hitherto unexplored prehistoric city of the cliff-dwellers buried under water when Roosevelt Lake was formed by the erection of the great Roosevelt dam were exposed by recent droughts which lowered the Lake level.

The lower fall of the Yellowstone river, in the Grand Canyon of the Yellowstone, is twice as high as Niagara.
